

days, and as soon as the last timber is placed, the centres may be removed, and each piece pressing on its neighbour, will tend to render the whole compact; this being done, bolt down the belts C and D, distant from each other, in a lateral direction, about ten feet; then cover the whole with old sail-cloth, or tarpawling, tar, and sand; of the tar and sand, two or three coats may be laid on, which will fill every apperture, and form a permanent cover to the total exclusion of the air and rain. The arch being thus covered and kept dry, would present a segment of a cylinder, at least one foot thick, guarded from the change of seasons, and in all probability would last many ages. The first segment being formed, proceed to raise the perpendiculars off the belts to support the second or upper segment; which segment should be coated in like manner with tar, &c. previous to laying on the earth and gravel; which earth and gravel should be, perhaps, eighteen inches thick, in order that wheels might never wear to the timbers or coating. Having described the construction, and exhibited the formation, by the engraving, it is but necessary to observe, that the staves composing the arch are not eat away by mortising, but preserve their whole strength; thus being joined like staves, two sides only of each stick is exposed, which being coated, the whole of the timber is completely covered from the weather. I will now leave my reader to reflect on the strength and durability of this arrangement; and then proceed to consider to what extent of span such bridges may be constructed.

In this I must call to mind my former remarks, that the segment of a circle must be compressed into a strait line, or sink in one part and rise in another, or the buttments separate before it is possible for a bridge to fall; by longitudinal pressure, the lateral tendency shall hereafter be observed, admitting the above proportions,

tions; the question is, Whether the arrangement of parts is so calculated as to guard against such accidents? which probably will appear by the following considerations:

First, the buttments may be made to resist any weight, by giving a greater weight of stone than there is weight of materials in the arch*.

Second, the timbers being laid side by side, like staves, and pressing on each other, leave not the least aperture into which the parts of mortised and framed timbers might be compressed; hence, several timbers, in a long arch, must absolutely be compressed into nothing, before the segment could become a strait line.

Third, that it may not vary its position, by sinking in one part and rising in another, with the various weights, I will consider the staves and belts only: it must be observed, that by bolting down the belts, which belts may be from thirty to forty feet long, and break joint, as in Fig. II. the whole arch will become like one solid piece of timber, bent between the piers. I will now suppose such a bridge forty feet broad, the timbers combined eighteen inches thick; hence, admitting that it was constructed of wood as light as fir, each lineal foot would weigh one ton and a half, hence every thirty feet forward would weigh forty-five tons; as a waggon, when loaded, seldom weighs more than five tons†.

* Although this may not be necessary, it is certain; and as it is more my intention to exhibit the possibility of constructing bridges of a great span, than to point out the precise proportion of the parts, I conceive, by shewing it possible, future deliberations of ingenious men will determine the proportion.

† By this I mean the broad-wheeled waggon of England, the American waggon is seldom more than three tons.

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